

24 January 1969

MEMORANDUM FOR: DDI Planning Officer  
Assistant Deputy Director for Intelligence

SUBJECT: NPIC R&D - <sup>FY/</sup>1971

1. I was advised yesterday of the directorate mark on a budget submission for NPIC's R&D in 1971 totaling [ ] This sum includes approximately [ ] for management support, leaving a total of about [ ] for pure R&D. Of this total, [ ] is marked for real-time R&D and the remainder [ ] for non-real-time R&D work.

2. The [ ] figure is compared with a total of [ ] requested by the Center. (Management support added to this figure brought the [ ] total to slightly more than [ ]

3. I find the reduction to be excessive and urge reconsideration. Center plans are structured on an expectation that the future will be faced with roughly the manpower and dollar resources now available. To make this expectation realistic, I have felt that it must stem from revised working procedures, availability of essential equipment (much of it from current R&D efforts), and a continuation of a significant investment in R&D.

4. The realism of our expectations is questioned by some who believe we underestimate the impact [ ] as well. I remain convinced of the wisdom of our plans but I cannot carry this conviction myself (let alone hope to convince my colleagues here) if one of the propositions fundamental to our case, namely, R&D, continues to be a target for significant reductions. The analogy which recurs to me is

SUBJECT: NPIC R&D - 1971

that of a family provider, in precarious state of health, reducing his insurance coverage.

5. We are often asked (in fact, we ask ourselves even more frequently) to explain, rationalize, justify and defend our R&D programs, extending -- as in this case -- far into the future. The fact is that this is not simple, and I will not permit the Center to be glib or misleading. With the advent of unexpected technological developments and in view of the fact that we cannot at this time fully foresee likely demands for special equipment in the Center, we cannot state with precision or even with confidence how we will spend our '71 dollar. Nor do I believe it wise to try to design a list with bright and conclusive prospects for payoff in each case. Obviously, R&D programs carry some risk and I need some freedom to spend R&D dollars in pursuits that may later prove fruitless. I will seek, of course, to keep this to a minimum.

6. I recognize that our request for '71 R&D funds is in fact a request for increase over '69 and '70 levels and I know that requests for increases, automatically call for accompanying explanation and justification. Accordingly, I submit as an attachment a listing of proposed projects and a brief word concerning their importance.


7. What I now request for NPIC R&D in 1971 is:



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8. It is to be noted that this figure between now and 1971 could well vary up or down. We are only barely able to discern the early dimensions of the real-time problem which could prove more expensive than we now figure. On the other hand, some of the non-real-time projects may be canceled out depending upon results of interim studies and feasibility considerations.

9. In view of this and for reasons stated above, I am of the strong belief that it is neither necessary nor prudent at this time to pare our R&D dollars below the level I have suggested.

  
Executive Director  
National Photographic Interpretation Center

25X1

Attachment:  
a/s

DRAFT  
24 January 1969

ANNEX A

1971 NPIC R&D Projects

25X1 Automatic Target Recognition [ ]

The prime objective of this program is to develop a cloud-screening device as an aid to identify and discard cloud-covered imagery rather than continue to encumber PI time with forced visual scanning of all imagery, which traditionally is <sup>about</sup> 50% cloud-covered. By 1971, a prototype is expected to have been delivered and some part of the [ ] is expected to be put to modifying the prototype for production. Additional parts of the [ ] will go toward maintaining a state-of-the-art level of effort in examining prospects for automated ways to sort and identify selected targets during search and scan. For example, it would be efficient, we believe, to be able to search large batches of imagery with the intention of spotting only airfields or only iron and steel plants. We believe it is important to maintain annual efforts in fields such as these which are in keeping with the NPIC R&D role described in NSCID #8.

We see <sup>good</sup> high prospect for delivery of the cloud-screener prototype and hence for future modification. We see less definite prospects for success or pay-off in other fields but believe the efforts worth continuing at annual rates of [ ] is the contractor.

25X1 Imagery Analysis [ ]

25X1 The prime objective of this program is to learn more about the nature of

the photographic image, in particular, how to enhance and improve imagery as an aid to the extraction of better intelligence from the imagery. By 1971 we expect interim efforts to have led to our financing of the development of special equipment for imagery enhancement and restoration and a good part of the [ ] applies to this expectation. There is high potential for pay-off here. We expect current efforts to culminate in a live capacity to restore degraded imagery. The principle involved here could be applied with great cost-savings and high value to the collection effort. An enhancement capacity could permit the collection vehicle to acquire degraded imagery which could be restored on the ground.

Other efforts in this project will include studies of ways to improve the pay-off from microdensitometric work which involves the use of complex, high-cost special-purpose equipment to assess image densities as a means of aiding in the interpretation process.

#### Dry, Non-Silver Processes [ ]

The primary objective of this program is to develop film and equipment to permit dry, <sup>and</sup> non-silver processing of photo materials. This would be faster, cheaper and less noxious than current chemical processes. Eventual replacement of chemical facilities, probably several years away, could provide additional badly-needed space for other purposes in [ ]

Most of some [ ] ear-marked for 1971 investment in [ ] related efforts is for equipment development following current and interim years of research and studies.

An additional [ ] is set aside for possible equipment development related to current research inquiries underway in company's <sup>its</sup> other than [ ]

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Mensuration Equipment State-of-the-Art 

We feel we must, as the responsible PI element dealing with research and development and as the imagery component which concentrates on precision measurement of targets and objects, take the initiative in pushing the state of art of mensuration technology and equipment. It is not now possible to specify what tasks will be pursued but the project is so intrinsic to our mission and responsibility and so in keeping with the advent of imagery of improved resolution that we have no hesitation in budgeting for it now.

Mensuration equipment developed now or in the near future (particularly the stereo comparator due for delivery later this year) will probably satisfy our needs between now and 1971 but by then we should be active once again in the R&D field *looking ahead to new generations of gear at a future time.*

Precise Measurement Studies 

This is strictly research, but its findings are likely to affect equipment development. We need constantly to be aware of the interplay between requirements for measurement accuracies, the nature of current imagery, and the qualities of available mensuration equipment. A basic question to be asked at frequent intervals is: how accurate must our equipment be? The answer of course has major import for our equipment development programs.

We need, for example, also to have alternatives in hand for stating our needs for vehicle attitude data as an aid to our measurement work. Attitude devices can run to extremely high costs and we need to be able to show with certainty why they may or may not be necessary.

These problems are simply stated here but the solutions involve complex theory and technique. The proposed research will be aimed at such solutions.

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## IIS Product Improvement ( )

Doubtless there will be advances made between now and 1971 (and thereafter) in the ADP field. New devices, new techniques and add-ons will be available. It seems certain we will want to consider adapting some of this to our own Integrated Information System. Adaptations and modifications are likely to require development funding. We have set aside 150K for this purpose.

## Test and Evaluation Equipment ( )

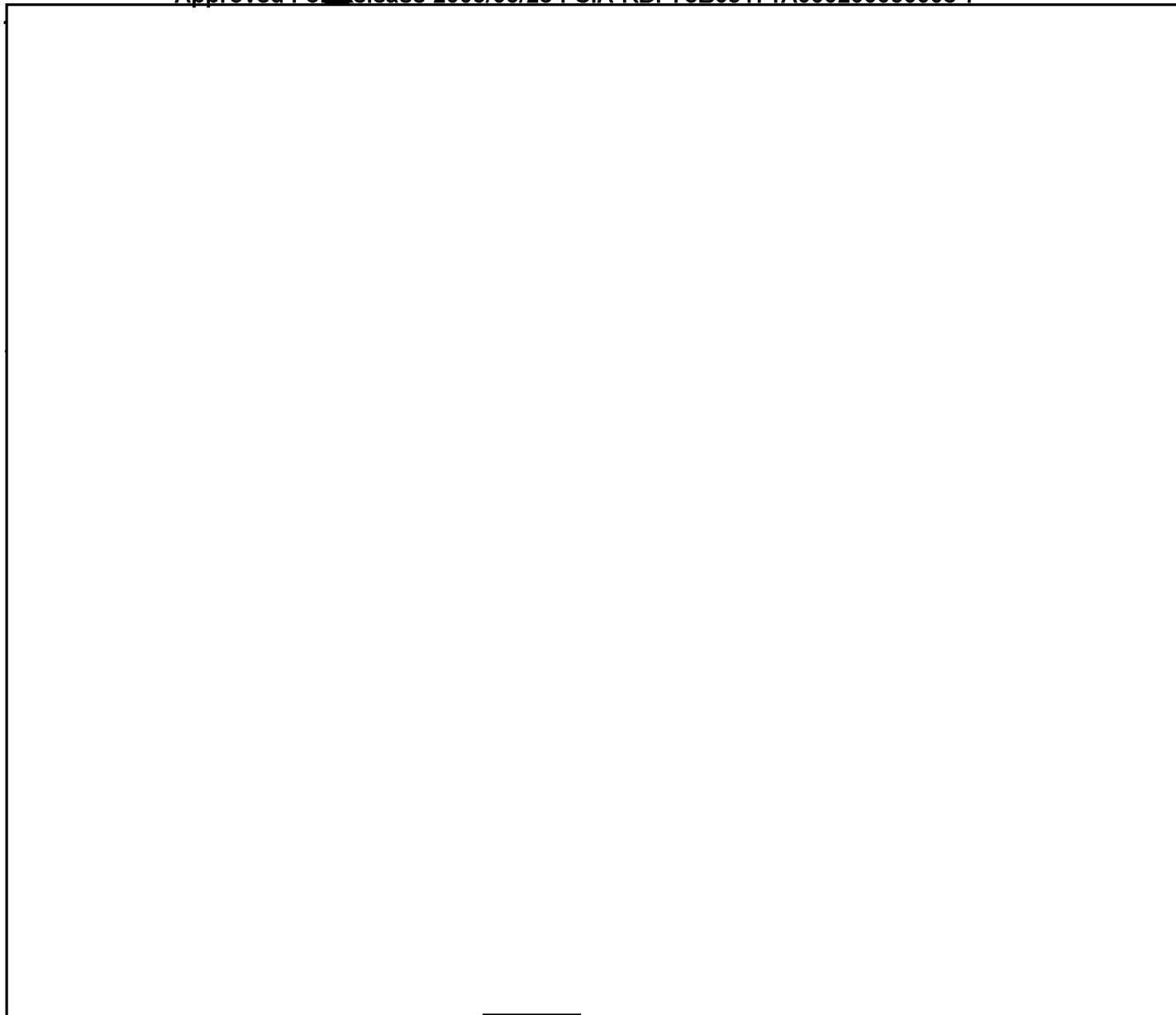
The equipment we are developing has become increasingly complex and unique. It is developed and produced in accordance with <sup>our</sup> specifications. ~~we~~ <sup>A</sup> derive as accurately as possible. It is not always possible to use existing devices to check contractor performance in meeting specifications. <sup>for NPK</sup> To be able to do so will require development of specialized equipment. If we do not do this we will rely solely upon contractor assurances and we will run the risk of employing equipment with built-in and undetected flaws <sup>or shortcomings</sup>. This would of course affect the quality and accuracy of our work. *It is particularly important to have calibration equipment to evaluate total equipment performance.*

## Automatic Dodging Equipment ( )

"Dodging" is a technique employed to render with as much fidelity and quality as possible the densities or shadings of imagery in the production of photographic prints. We believe it important to work toward development of advanced techniques and equipment to accomplish two major tasks:

(a) to permit the making of chips or prints with the highest possible quality for assistance to imagery interpreters; and

(b) to permit production of high-quality photographic prints for our publication effort--an effort for which the Center is responsible under the National Tasking Plan.



25X1 Ultraviolet Rear Project Viewer [redacted]

25X1 The proposed '71 sum is marked against culmination of a long-standing R&D project, which has involved <sup>about</sup> [redacted] to date and [redacted] more in FY 70. The culminating phase is production of a UV rear projection viewer. The objective of our R&D efforts in obtaining rear projection viewing systems is to permit a number of imagery analysts to study the same imagery at the same time.

25X1



The difficulty in development of such a system stems from the need to have a screen material which will not degrade the imagery and to have a light source which does not inhibit viewing. Technically, these are difficult to achieve and the risk of failure is fairly high. For this reason, we have been approaching these problems in phases, carefully testing for ultimate feasibility at frequent intervals. The UV development is currently snagged in a technical hang-up. If it proves insoluble the '71 proposal becomes a non-starter.

25X1 PI Correlated Stereogram Maker

Objective of this program is to develop a device to permit imagery interpreters automatically to correlate and align imagery in stereo for individualized detailed study of targets in stereo. Equipment now available requires time-wasting settings of dials and controls and these must be re-set with each individual look at various targets. This will add to our effectiveness in producing detailed, third-phase reports.

Technically, this is a very high risk program with uncertainty of eventual success. If 1970 explorations and our coming experiments with the correlation system of the automatic stereo scanner prototype so indicate, we will drop the '71 investment in this project and convert the funds instead to development of a device employing the correlation principle of the scanner.

What this means is that we will be devoting  in '71 to equipment development of some kind in this field.

Photo Image Manipulation Viewer Study  25X1

This is planned as the second of a two-year study of feasibility of developing a device of advanced design to be used to sharpen and delineate

imagery in its display in viewer systems so as to <sup>enhance</sup> sharpen the interpreter's ability to extract detailed intelligence. If the feasibility studies are optimistic, we would expect fabrication of the device to take place in FY 72.

25X1 Imagery Interpretation Research

This is a continuation of a long-standing research project which began in FY 66 as the Human Factors Program.  is the contractor.

<sup>A major</sup> The prime purpose of the program has been to insure that the design and intended use of our equipment is compatible with human traits and habits. Other purposes include development of criteria to improve our programs for the selection and training of imagery analysts and to modify our physical plant and its facilities to improve the interpretation process.

We believe that studies of this kind are worthy of indefinite continuation. Our environment at NPIC is likely to be in continuous change and with the advent of new equipment and new types of imagery we anticipate need for a rather constant level of effort. Prospects for payoff are remarkably high. Success is to be measured not solely by the findings and data compiled by the contractor but by the progress we make in applying these results.

(X)

By 1971 we believe it quite likely we will find it advisable to do this. There is also an element of double-tracking in our 1970 and 1971 plans for spending a total of [ ] research and development in this field. The potential pay-off is worth it.

Automatic Transport Materials [ ]

This is a project of considerable uncertainty. We may have a big problem in the physical handling of larger quantities of imagery than we have had to date. How to accomplish this and avoid non-productive, waiting time for significant numbers of PI's awaiting their turns at the imagery is a problem we need to define and solve. Definition and solution may not require the sum we think 1971 may call for but we believe it necessary to include it. Chances strike us as better than even we will need to develop some equipment to meet out tasks. A current study of this problem is expected to give us what we need to make a clearer judgment in the next six months or so.

Chip Storage & Retrieval [ ]

This is in the same indecisive state as the project described immediately above. [ ] the larger quantities of imagery seem likely to require, if for no other reason than economy, processing of imagery in chip form rather than in roll film. If current studies (underway in NPIC, NRO, and ACIC) confirm this, we will need to invest in development of equipment to store and retrieve <sup>photo</sup> chips as an assist to the PI progress. As in the case above, we believe chances are good that this need will be certified within the coming few months. If there is no need, the project will of course be dropped.

(When Filled In)

FY-1971

Date 1 July 1969

Component

TSSG

Object Class

25

Planning Level \$  
(Thousands)

25X1

FY 71

Priority	Item	Unit Price	Quantity	Total Price	Justification/Comments
Crucial					Photointerpretation support for Human Factors Research (DED) 25X1
Crucial					Repair and/or modify electronic equipment as required (DED)
Crucial					Repair/modify mechanical equipment as required (DED)
Crucial					Repair/modify PI equipment as required (DED)
Crucial	Optical/Computer/Elec- tronic Consultant Services				Scientific consultation on highly complex imagery exploitation systems. (DED)
Crucial	Quick Reaction Investiga- tions				Several small T&M contracts to provide answers to critical questions prior to letting of major R&D contracts. This work would primarily involve the development of real-time systems (DED)
25X1					
Crucial					Consultation and review of contractor's optical designs.
Advantageous					Consultant and advisor on Human Factors problems in general, and more specifically on the problems related to PI vision, image perceptability, and to visual requirements of optical systems (DED)
Advantageous					Consultant services of [ ] a senior research scientist in behavioral sciences. Specifically, his services are primarily in the fields of PI training improvement and in man/machine systems theory application. 25X1

SECRET

(When Filled In)

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(When Filled In)

FY-71

Date 1 July 1969

Component USCG  
Object Class 31

Planning Level \$ \_\_\_\_\_  
(Thousands)

Priority	Item	Unit Price	Quantity	Total Price	Justification/Comments
Advantageous	Electronic Calculator ‡			<div></div>	A small rapid desk calculator (programmable) to facilitate scientific, technical and statistical calculations related to internal and external R&D projects. 25X1

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25X1

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